A SUPERHOME in Christchurch Under Winter Conditions: Real Performance Through Post-Occupancy Evaluation

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Abstract

The profile of energy-efficient, high performing, ‘sustainable’ buildings have greatly increased in recent years in response to the need for change in design, construction, and maintenance of the built environment. Residential buildings in particular have been in the spotlight when it comes to the application of ‘green’ building concept. Although it is generally understood that a ‘green’ home provides a healthier and more comfortable housing environment to its occupants aside from generating energy efficiency, little is known about the extent to which such a home actually performs while in use. In New Zealand, a nationwide industry led initiative, known as the ‘Superhome Movement’, was established to promote the designing and building of environmentally sound, healthier, more energy-efficient and overall high-performing homes known as SUPERHOMEs. This research investigated the post-occupancy performance and indoor environment quality of a SUPERHOME under winter conditions. This study incorporated the analysis of energy use, monitoring of IEQ, and the surveying of building occupants. Results suggest that (1) the study building has not achieved its design potential with regards to electricity use in the first winter that it is occupied; (2) a SUPERHOME achieves a high level of thermal performance and provides adequate IAQ in winter conditions; and, (3) occupants’ overall perceptions towards the post-occupancy and winter performance of a SUPERHOME are positive. These findings lead to a realization that the ‘green’ status of a build should not be limited to ratings by third-party certification.

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Abbreviations

BRANZ	Building Research Association of New Zealand
BRS	Building Rating Scheme
BUS	Building in Use Studies
CO	Carbon Monoxide
CO_2	Carbon Dioxide
dB	decibels
dB(A)	A-weighted decibels
GHG	Greenhouse Gas
HEEP	Household Energy End-use Project
IAQ	Indoor Air Quality
IECC	International Energy Conservation Code
IEQ	Indoor Environment Quality
LPM	Litres Per Minute
NIWA	National Institute of Water and Atmospheric Research
NO_2	Nitrogen Dioxide
NZBC	New Zealand Building Code
NZBCSD	New Zealand Business Council for Sustainable Development
NZGBC	New Zealand Green Building Council
OITC	Outdoor Indoor Transmission Class
PIS	Participant Information Sheet
POE	Post Occupancy Evaluation
PV	Photovoltaic
RH	Relative Humidity
SHM	SUPERHOME Movement
SLM	Sound Level Meter
STC	Sound Transmission Class
TL	Transmission Loss
uPVC	Unplasticized Polyvinyl Chloride
VOC	Volatile Organic Compound
WHO	World Health Organization